

E-Health Approach to Link-up Actors in the Health Care System of Austria

Thomas SCHABETSBERGER^{a,1}, Elske AMMENWERTH^a, Ruth BREU^b,
Alexander HOERBST^b, Georg GOEBEL^c, Robert PENZ^f, Klaus SCHINDELWIG^d,
Herlinde TOTH^e, Raimund VOGL^f, Florian WOZAK^a

^a *University for Health Sciences, Medical Informatics and Technology, Hall, Austria*

^b *Leopold-Franzens-University Innsbruck, Innsbruck, Austria*

^c *Innsbruck Medical University, Innsbruck, Austria*

^d *Tiroler Landeskrankenanstalten GmbH, Innsbruck Austria*

^e *Wiener Krankenanstaltenverbund, Wien, Austria*

^f *Health Information Technologies Tyrol, Innsbruck, Austria*

Abstract. “Electronic health services are important” the EU commission stated in the E-Health action plan. By these means access to health care can be improved and the quality and effect of the offered medical services can be increased. By introducing the e-card in Austria, an overall link-up of nearly all health service providers of the external sector (e.g. family doctors) was achieved. In 2005 the Austrian E-Health Initiative (EHI) of the Austrian Federal Ministry for Health and Women mapped out a strategy to organise the development of the health system towards an integrated patient-centred. Hereby the electronic health record (EHR) plays a decisive role. The aim of this study is to analyse requirements for a virtual, cross-institutional and patient-centred electronic health record from the point of view of the exemplary main actors (Doctor and Patient), to define conditions, and then to evaluate the thus derived, specific concept of implementation. Aside from the two main actors regarding medical acts, namely the institution treating a patient (e.g. doctor, paramedic or nurse) and the patient receiving treatment, a row of other actors could be identified. Group assessment techniques with representatives of these actors resulted in an overview of required functions of an EHR. As a proof-of-concept an information system architecture conformable to the IHE XDS architecture for cross enterprise document sharing is currently being constructed and evaluated in the course of a pilot-project. If the core architecture fulfils the expectations, then a further extension to other hospitals and resident doctors, and subsequently also to the other actors of the health system, is planned. Since both legal and socio-technical requirements are presently not yet entirely met, and since there are also deficits from a methodical viewpoint, a complete implementation and widespread introduction will be a long term goal.

1. Introduction

“Electronic health services are important” the EU commission stated in the E-Health action plan. By these means access to health care can be improved and the quality and effect of the offered medical services can be increased [1]. By introducing the e-card, an overall link-up of nearly all health service providers of the external

¹ Corresponding Author: Dr. Thomas Schabetsberger, University for Health Sciences, Medical Informatics and Technology, Eduard Wallnofer-Center 1, A-6060 Hall/Tyrol, Austria. E-Mail: Thomas.schabetsberger@umit.at, Web: <http://ijg.umit.at>.

sector (e.g. family doctors) was achieved, and therefore the technical infrastructure for subsequent projects was created [2].

The processing and storage of medical data is currently however mostly geared towards the respective individual, institutional demands [3]. The transmission of data between various health service providers takes place in a provider-oriented way in the sense of a directed communication; a large part of this communication is paper-based, a smaller part is electronic via Fax, encrypted and signed E-Mail or secure Web [4-6]. From literature study it is known, that a change of this provider-oriented, directional transmission of reports and findings towards a more patient-centred provision of reports and findings would support cross-institutional information-processing, and would therefore also improve the quality and efficiency of the health system and increase the safety of medical treatment and compliance [7]. In 2005 the E-Health Initiative (EHI) of the Austrian Federal Ministry for Health and Women compiled a strategy to organise the development of the health system towards an integrated patient-centred care on a long-term basis [8]. Hereby the electronic health record (EHR) plays a decisive role. The electronic health record summarizes health-related data of an individual, acquired continuously from either outpatient or in-patient treatment, and which is saved on a digital storage medium. The most important distinguishing feature of the electronic health record in comparison to the electronic patient record is the sole control of the patient over his health record and therefore his medical data. The patient alone decides who may view and use information from his health record. Presuming that, independent of the electronic health record of an individual, there are many electronic patient records in the hands of doctors and hospitals existing parallel to each other, the EHR should constitute a higher ranking entity over all these patient records at the health care providers and should also integrate these single and distributed patient records [7, 8].

The aim of this study is to analyse requirements for a virtual, cross-institutional and patient-centred health record from the point of view of the exemplary main actors (Doctor and Patient), to define conditions, and then to evaluate the thus derived, specific concept of implementation in the course of a pilot project existing between the „Tiroler Landeskrankenanstalten“ (TILAK) and the „Wiener Krankenanstaltenverbund“ (KAV) – two major hospital holding companies from Eastern and Western Austria.

2. Methods

The realization of this study and of the general project-management is based on the 5-step-method for management of health information systems. Through systematic literature analysis and in workshops actors were identified, who are currently already exchanging data in the health service in a directed way, and who would profit as expected by a shared electronic health record in the sense of quality-improvement or financial savings. The next step was to draw up a functional requirements profile from each of the actors own viewpoint by using creativity-methods, these were then prioritized and the requirement profile was then iteratively discussed and revised with representatives of the identified actors (Delphi method). With the help of scenario techniques future scenarios were designed. Based upon this the core architecture of a distributed, virtual health record was developed by applying software-engineering methods (experimental prototyping), prototypically implemented and evaluated.

3. Actors in a cooperative health care system

Aside from the two main actors regarding medical acts, namely the institution treating a patient (e.g. doctor, paramedic or nurse) and the patient receiving treatment, a row of other actors could be identified (Fig. 1). This includes insurers, who correspondingly remunerate the medical service rendered by the person giving the treatment, and who therefore must have access to certain areas of medical documentation relevant for the account statement. Pharmacies redeem medical prescriptions (paper-based or electronic) issued by doctors and communicate these to the insurers for the account settlement. A line of communication leading from pharmacies to doctors is currently not yet established, but could play a more important role in the future (e.g. feedback to the treating institution about whether or not medications were collected). At the same time it is presumed, that institutions treating patients, insurers, national institutions or medical researchers would benefit greatly from anonymous and consolidated data in order to regulate the health system and to improve the quality of medical care.

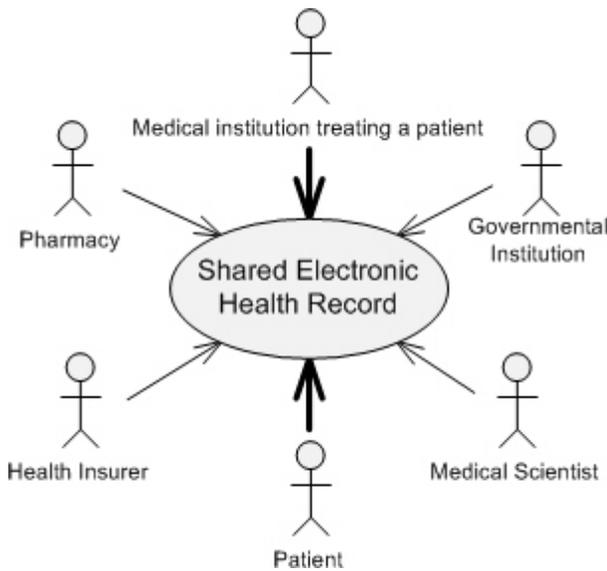


Figure 1: Schematic description of identified actors in the health system. Aside from the main actors (medical institutions treating a patient, bold type arrows) there exist a row of other actors in the health system. It is presumed, that with the help of a common database in the sense of a distributed (virtual) electronic health record, the cooperation amongst the actors could be improved and hence a lowering of costs and a quality increase could be achieved. For more information please see text.

4. Actors functional demands of an electronic health record

Several workshops and interviews with representatives of the identified actors resulted in a list of functional demands. In the following, patients and institutions treating patients are exemplary viewed as main actors and their functional demands are presented in a sequence of stated importance. With exception of the pharmacies (e-

prescription) all other actors are predominantly interested in non-personal, anonymous and consolidated data:

Requirements from the patient's viewpoint are:

- Guarantee of the highest possible degree of data privacy protection and security
- Access to one's own health record and control over access rights
- Medical contents should be adapted for patients
- Possibility to add personal entries and to keep medical diaries

Institutions treating patients (e.g. doctors) see the essential advantages above all, if

- Access to information relevant for treatment (medical history) can occur promptly, irrespective of the institution where this information was generated.
- The presentation of the data is adapted to the respective special field of the doctor, so that essential information can be comprehended in a short time. The possibility of retrieving an emergency data set (e.g. list of medication and diagnoses, allergies, blood group) in case of an emergency would be helpful.
- Emergency access could be carried out without explicit consent of the patient but with documentation in his medical file (the patient must later be notified of this)
- Charges can be electronically transferred to the health insurers
- Medications can be prescribed electronically (e-prescription) and if the pharmacy can then confirm whether a medication was picked up or not.

5. General conditions, requests and experiences

In addition to the demands from the users' point of view there exist technical, organizational, legal and social general conditions and requests, as well as a series of doubts voiced by users:

- Guarantee of highest organizationally and technically possible data security, high scalability/extensibility and high availability, avoidance of a „single point of failure“ or a „single point of attack“ respectively.
- Consideration/Integration of existing infrastructure and request of distributed data storage, cost-saving operation (no additional data processing centers)
- Doctors concerns regarding flood of information
- Strong request for an „Open Source“ solution
- Doubts regarding the „transparent patient“ or also the „transparent doctor“
- Non-existence of a common patient-index as well as no generally accepted common standard (neither on a communication level nor in content) are regarded as especially big challenges.
- 4-step-model for trans-institutional inquiries of medical findings as a legal issue.

The 4-step-model for trans-institutional inquiries of medical findings has been worked out and offers an area of certainty of the law and with it a legal requirement for automated, reciprocal medical inquiries amongst health service providers. The basis for retrieving information from another health service provider is the documented written consent of the patient. This is agreed upon between the communication partners in

form of a contract (controlled by means of random checks). In the case of an inquiry the first step amongst the communication partners is the identification of the patient. If this allocation could be made, then a list of these patients' visits at the concerning health service provider can be requested and transmitted. In a third step the summarizing document pertaining to a certain visit, e.g. in form of a doctors or patients letter, can now be requested and transmitted. In step 4 further medical data (e.g. related reports or images) can be requested and transmitted (Fig.2).

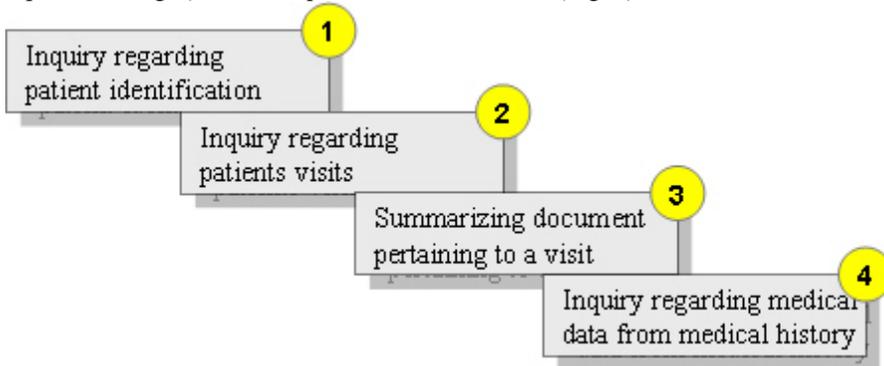


Figure 2: Graphic description of the 4-step-model for medical inquiries. Through fully- or partially automated sequential step-by-step-handling of these four levels a reciprocal medical inquiry between health service providers under preservation of data protection regulations can be realized. For closer information see text.

6. Prototype of a trans-institutional information-system core-architecture as the basis of a distributed electronic health record

As a proof-of-concept an information system architecture conformable to the IHE XDS architecture for cross enterprise document sharing is currently being constructed in a simpler way in the course of a pilot-project. Partners in this pilot-project are the TILAK and KAV (together approx. 40.000 employees and 500.000 inpatients per year). In both institutions web portals are created which provide for a patient search, their hospital stays and accompanying reports becomes possible in the respective other institution. In order to provide electronic reports and findings for the assigning resident doctors the TILAK already operates a web portal. This web portal is improved by adding appropriate input masks for entering necessary demographic data and visualizes the results of the queries. The completion of the described prototype is planned at the end of the first quarter of the year 2006. As of this time the following transactions will be possible:

- Doctors employed by the TILAK or KAV will have limited access on a trial basis to findings and reports on patients from each other.
- Resident doctors who are currently already participating in the web portal of the TILAK will have limited access on a trial basis to findings and reports available from their patients in either Tirol or Vienna.

7. Discussion and Outlook

The outlined difficulties of conventional transmission of reports and findings between health service providers are being discussed internationally by medical institutions, research institutions and lastly also by political institutions. In Austria there exists a vision of an extensive, trans-institutional electronic health record [8]. The implementation by means of the described prototype is currently being evaluated. If the core architecture fulfils the expectations, then a further improvement and extension to other hospitals and resident doctors, and subsequently also to the other actors (including the patient) of the health system, is planned and will be done within a project called health@net [9]. Although the list of conditions and requirements might not be complete. Since both legal and socio-technical requirements are presently not yet entirely met, a complete implementation and widespread introduction will be a long term goal. The arising questions concern in particular the uniform definition of relevant contents in the electronic health record, the clarification of standards for data filing, and last but not least the financing of set-up and operation. Together with its research- and cooperation-partners however, the health@net project consortium participates in initiatives on a national and international level, whose aim is the creation of those requirements needed to implement and operate a patient-centered, universally accessible and secure electronic health record.

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